

A PLEISTOCENE *TERRAPENE* HIBERNACULUM, WITH REMARKS ON A SECOND COMPLETE BOX TURTLE SKULL FROM FLORIDA

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Very recently (1958) I published a study on the Pleistocene box turtles of Florida. Of the localities from which remains of these turtles were available, Reddick I B, Marion County, was truly outstanding in providing such large numbers of specimens. Many individuals are represented by complete shells. The concentration of so many individuals of one species in one locality, when fragments are only reasonably common in others, is most unusual.

The fairly large number of articulated shells, many with associated limb and girdle elements, or even fragmentary or complete skulls, seems to rule out predation by some carnivore. The turtles seem to have died in place, or nearly so. The assemblage appears to be a natural one. Individuals of all sizes are represented in the material at hand. Male and female specimens are found in almost equal numbers. Most curious is the fact that all of the specimens are found in a single bed no thicker than two feet. Only a few fragments of this species are found above and below this bed. Included in the *Terrapene* stratum, but apparently much more abundant above and below it, are numerous fragmentary remains of *Testudo*, *Gopherus*, *Ursus*, *Canis*, *Felis* and *Paramylodon*. Most of the snakes and lizards collected from Reddick I B originated from the *Terrapene* stratum. Normally the scattered remains of fairly large numbers of many different species of animals would suggest that their bones accumulated over a long period of time. In no other known locality in Florida are so many *Terrapene* bones restricted to such a narrow zone. It seems highly unlikely that the bed simply represents a period during which the box turtle was extremely common in the area. Rather, it appears that the turtles accumulated in the cavern or fissure during a reasonably short period of time.

Based on a number of well documented facts it is obvious that the beds in the entire exposure represent an ancient cave filling.

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Thus the box turtles could have fallen into an opening in the cavern roof, as most of the other vertebrates might have done. However, this implies the unreasonable conclusion that many more *Terrapene* fell into the cave during a short period of time than almost all of the other turtles and mammals did over a much longer period of time. On the other hand, the *Terrapene* might have crawled into the cave or fissure over a short length of time. However, the problem then presents itself as to how or why the turtles died there. Without additional elaboration of the hypothesis it also fails to explain why *Gopherus* and *Testudo* are so common above and below this bed, but represented by only occasional fragments within it.

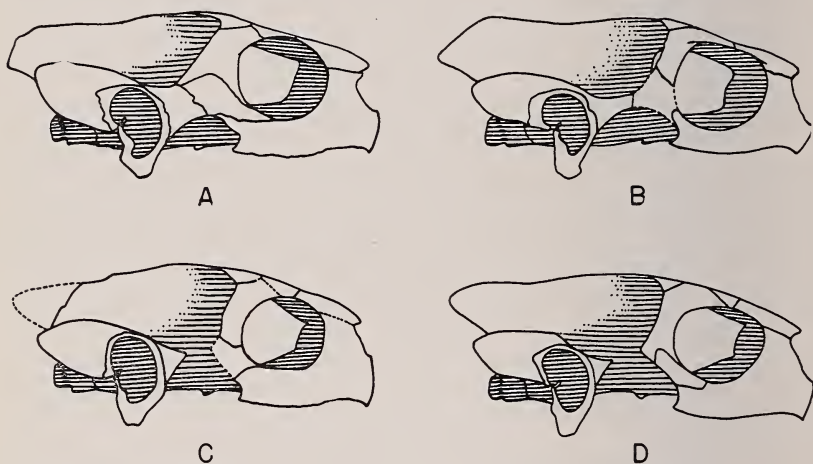


Figure 1. Lateral views, skulls of Recent and Pleistocene box turtles, *Terrapene carolina*. A. *T. c. major*, Recent. B. UF 2913, Pleistocene, Reddick I B, *T. c. carolina* X *T. c. putnami*. C. UF 9973, Pleistocene, Arredondo I C, *T. c. carolina*. D. *T. c. carolina*, Recent.

Box turtles are known to congregate in hibernacula during the winter months in some more northern areas (Carpenter, 1957). As far as is known they do not congregate in any numbers in Florida during the winter or summer months at the present time. If the stratum at Reddick I B represents a winter season, in which hibernating box turtles secreted themselves during cooler weather it would explain the near absence of articulated *Gopherus* and *Testudo* in the same bed, since at least the former is known to spend the winter months at the bottom of its burrow. However,

during the warmer months *Gopherus* is quite active, and might easily fall into small fissures. At least *Gopherus* and *Testudo* are poorly adapted to crawling up out of steep depressions. *Terrapene* seems fairly accomplished in this ability. If these turtles entered the fissure regularly during the cooler months for refuge, it is assumed that they could manage to get back out. This might explain their near absence in the beds above and below the *Terrapene* stratum in which *Gopherus* and *Testudo* are found.

The presence of a hibernaculum as seems to be represented at Reddick suggests much cooler conditions than are found in the peninsula at the present time. Brodkorb (1957) has suggested that the Reddick deposits represent Illinoian maximum. I have recently indicated (1958) that these deposits do not, in all probability, represent the maximum extent of the glacier, but some undetermined time slightly before or after this time. In any event, conditions near, or at Illinoian maximum were certainly cooler than at present. Several vertebrates from the deposit are presently found only to the north of Florida (Auffenberg, 1956; Brodkorb, 1957; Olsen, 1958).

On the basis of the discussion of possibilities above it is suggested that the narrow, light-colored *Terrapene* bed (and probably others) at Reddick I B represents an accumulation during the winter months. The more organic layers immediately above and below this stratum may represent deposition during warmer months. This then assumes that accretion occurred at a rate of about one foot per season for the three seasons considered. Perhaps this is more than can reasonably be accounted for during such a short period of time. However, deposition below, or very near an opening in a cavern can be expected to be quite rapid, especially with heavy rainfall, as has been postulated for glacial times in southeastern United States (Odom, 1952). Whether or not these beds represent different seasons can probably be proven only by a detailed comparative study of the avian fossils from the different strata. Migrant species might be present in one bed, and not in the other, etc.

The presence of so many individuals in the *Terrapene* layer indicates that some catastrophic event must have taken place during the cooler months. There are two main possibilities: the opening to the surface was accidentally filled in by debris so that the animals were effectively trapped and could not reach the

surface, or the site, of adequate protection for a normal near-Illinoian winter, was insufficient for at least one year. In either event, the slight movement of individuals down the slope since their death can be most easily attributed to slumping during some post depositional phase of cavern filling. The reasonably complete nature of the turtles and the remaining vertebrates clearly indicate that the beds were formed close to the surface and to the opening of the fissure, or small cave.

In the recent publication previously mentioned (Auffenberg, 1958) I described the only complete Pleistocene *Terrapene* skull then known in Florida. This skull (UF 9973),² from Arredondo I C, Alachua County, was associated with a fine shell. Both the shell and skull show close affinities with *Terrapene c. carolina*, a form now found north of peninsular Florida. Only a partial skull was available from the important locality at Reddick I B, Marion County. Unfortunately, certain important diagnostic morphological features were missing from this specimen. On the basis of a reasonably large sample of complete shells from the same locality, the specimens were referred to *T. c. carolina* X *T. c. putnami*. A complete specimen of box turtle from the same locality has recently been found (UF 2913). The individual apparently died after closing its shell. As a result, the entire skeleton is intact. The skull lacks only the jugal. It indicates that the previous reconstruction of missing parts on UF 9933 from the same locality is slightly incorrect. A postorbital bar is present, but the quadratojugal is narrower than previously supposed. The jugal, though missing, is definitely large, and presumably more or less triangular in side view. The postorbital is considerably narrower than in *Terrapene c. major*, and only slightly narrower than in most specimens of *T. c. bauri*, much more like that in *T. c. carolina* and *T. c. triunguis*. The squamosal is large, long, unlike that in *triunguis*, but more like that in the other Recent subspecies. The postpalatine foramina are smaller than those in *major*, but larger than those in *bauri*, *carolina* and *triunguis*. The fronto-nasal area is larger than that in *bauri*, *carolina* and *triunguis*, but smaller than that in *major*. The temporal ridges are more well developed than in large specimens of *bauri*, *triunguis* and *carolina*, but not as

² University of Florida Collection.

strongly produced posteriorly as in *major*. Figure 1 illustrates the new skull from Reddick I B.

The newer specimen proves what was suspected before—that the skull, as well as the carapace, illustrates many characteristics which are intermediate between those of *T. c. major* and the remaining living subspecies. In the previous publication *T. c. major* was interpreted as a relict intergrade population between *T. c. carolina* and the larger extinct Pleistocene form, *T. c. putnami*. The latter differs from *T. c. major* only in being larger, as far as is known. The Pleistocene Reddick I B population is considerably larger than Recent populations of *T. c. bauri*, *triunguis* or *carolina*. Thus this population is thought to be an intergradient one between *T. c. carolina* (or *bauri* ?) and *T. c. putnami*. A complete skull of the latter has not yet been found. It is to be hoped that in the near future a skull of this interesting extinct form will become available for study.

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